

such as in a translucent strength annotation overlay on each search result or a strength annotation in a corresponding progress tab. Strength refers to the relative quality of the search criteria matching for a given search result. In one embodiment, the greater number of hits in a given search result target page, the stronger the result.

[0073] **FIG. 13** illustrates detailed operations of the analyzing process in an environment of the present invention. Search results are received in the receiving operation **1300**. In one embodiment, the search results include the search results Web page received from the search engine. In alternative embodiments, the search results may include information processed in the preparation operation **1210** and the analysis data generated from the analysis operation **1207**. A search results target page is downloaded from its resource location (e.g., the search engine) in download operation **1302**. In one embodiment of the present invention, the target page is stored in the cache **1316**.

[0074] An analysis operation **1304** analyzes the layout of the target page, in part to provide partitioning and reformatting information for the SmartView and detailed view modes. The layout analysis results are stored in the cache **1316** for later use. A thumbnail operation **1306** generates a thumbnail image from the target page for use in the SmartView display. The generated thumbnail image is stored in a cache **1316** for later use. A linguistics analysis operation **1308** analyzes the text in the target page and stores the linguistics analysis results in the cache **1316**, in one embodiment including positional information associated with the linguistic features, for later use. Statistical properties of the linguistic features, such as frequency of the feature occurrence in the documents or logical units of the documents, or occurrences of the feature across the documents in a given set are stored in the cache. Based on the linguistic and statistical information about content elements of the documents, an inverted index is built and stored in the cache to support further searches. The inverted index may be associated with a page and/or with individual logical sections of a page. By providing granularity in the inverted index down to the logical section level, search statistics may be created that are associated with individual logical sections of the page.

[0075] Based on the linguistics analysis operation **1308**, an analysis operation **1310** uses the inverted index and calculates the search statistics (e.g., how relevant or similar is the document or document portion, e.g., a logical section, is to the user query) in preparation for annotating each target page displayed in SmartView mode. In an exemplary implementation, the linguistics analysis operation **1308** includes statistical analysis of the content elements. The search statistics, such as relevance scores of an individual page or of individual sections of the page, can be used in annotating search hits to reflect the degree of relevance of a given hit or logical section. A looping operation **1312** repeats operations **1302**, **1304**, **1306**, **1308**, and **1310** for each target page referenced in the search results Web page. Having analyzed each result target page, the waiting operation **1314** awaits user selection of one of the search results.

[0076] **FIG. 14** illustrates operations for thumbnail marking and term highlighting in an embodiment of the present invention. With the analysis results of **FIG. 12** stored in the cache, a user may select one of the search results or one of

the corresponding progress tabs to view a SmartView mode of the corresponding search results target page (see e.g., **FIG. 6**). A sending operation **1400** sends a target page selection request to the server, which receives the target page selection request in receiving operation **1402**. Based on the thumbnail image, the layout analysis results, the linguistics analysis results, and the search statistics analysis results stored a cache **1406**, a partition map for the SmartView display of the selected search results target page is generated with annotations by a generation operation **1404** and sent to the client. A receiving and displaying operation **1408** receives the annotated partition map and displays it on the client in SmartView mode.

[0077] From the SmartView display, the user may select a logical section for display in detailed view mode. A sending operation **1410** sends the user's logical section selection to the server, which receives the selection and extracts and processes the corresponding logical section from the target page stored in the cache **1406**. In an embodiment of the present invention, the extracted logical section is reformatted for a detailed view in accordance with the client's display, as shown in **FIG. 2**. A highlighting operation receives hit information from index stored in the cache **1406** and highlights the hits (e.g., terms satisfying the search criteria) in a selected logical section, which is sent to the client. A receiving and displaying operation **1418** receives the detailed view of the selected logical section and displays it on the client.

[0078] A Web search and a documents search in an embodiment of the present invention employ similar processes as described in **FIGS. 12, 13, and 14**. Furthermore, in either search embodiment, a local or remote search engine may be employed.

[0079] It should be understood that, while an exemplary embodiment has been described with regard to a handheld devices, it is contemplated that non-handheld devices may be employed with alternative embodiments of the present invention. For example, the annotation of search results target pages and search result Web pages may be advantageously applied in smart phones, desktop computers, laptop computers, set-top boxes, Internet kiosks, and other client devices. Furthermore, many such client devices have sufficient computing resources to perform the operations of the server and/or the search engine locally.

[0080] The exemplary hardware and operating environment of **FIG. 15** for implementing the invention includes a general purpose computing device in the form of a computer **20**, including a processing unit **21**, a system memory **22**, and a system bus **23** that operatively couples various system components include the system memory to the processing unit **21**. There may be only one or there may be more than one processing unit **21**, such that the processor of computer **20** comprises a single central-processing unit (CPU), or a plurality of processing units, commonly referred to as a parallel processing environment. The computer **20** may be a conventional computer, a distributed computer, or any other type of computer; the invention is not so limited.

[0081] The system bus **23** may be any of several types of bus structures including a memory bus or memory controller, a peripheral bus, and a local bus using any of a variety of bus architectures. The system memory may also be referred to as simply the memory, and includes read only